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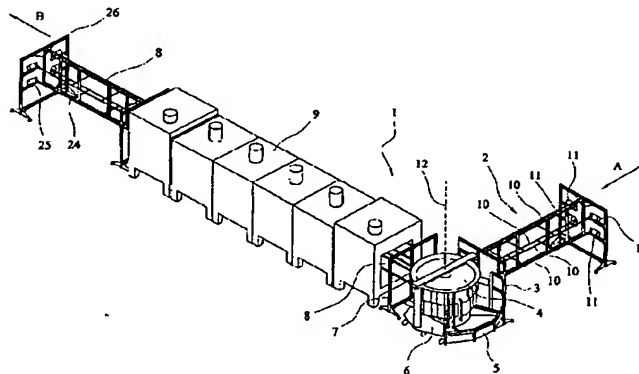
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[Continued on next page]

(54) Title: APPARATUS AND METHOD FOR REMOVING ADHESIVE LABELS FROM GARMENT HANGERS



(57) Abstract: An apparatus (1) for removing adhesive labels from garment hangers includes an input conveyor (2) for receiving garment hangers (not shown) and which terminates in a loading station (3) for loading the hangers onto a rotatable support (4). The support (4) faces a washing station (5), a pre-drying station (6) and an unloading station (7) for unloading hangers from the support (4) onto an output conveyor (8) which passes through an elongate drying chamber (9). The washing station (5) includes four water guns (not shown), each of which directs a thin high pressure and high temperature jet of water at the label area of a hanger in an up and down or side to side motion. The high temperature of the water causes the adhesive of the labels to melt, and the force of the spray removes the label and forces it into a collection chamber at the lower part of the washing station (5), where the water, label and adhesive residue are removed for cleaning.

WO 03/059536 A1

WO 03/059536 A1



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

Apparatus and Method for Removing Adhesive Labels  
From Garment Hangers

The present invention relates to an apparatus and method for removing adhesive labels from garment hangers, and relates particularly, but not exclusively, to such an apparatus and method for removing adhesive labels from garment hangers to permit recycling of the hangers.

Many garment hangers for use in displaying garments for sale in retail outlets consist of a hanger body of plastics material, for supporting a garment, from which a hook of metal or plastics material for suspending the hanger extends. Indications of various sizes of garment are provided by means of labels, usually of paper, attached to the body of the hanger by means of adhesive, or by means of size markers mounted to the hook of the hanger.

A significant proportion of such hangers are recycled, and in order to enable recycling to take place, the hanger must be separated into its different constituent materials. Adhesive labels are presently removed from hanger bodies by means of a hand-held hot air gun which melts the adhesive attaching the label to the hanger body. This known method of label removal suffers from a number of disadvantages. Firstly, the use of handheld air guns is very labour intensive and makes the process very costly, especially when large numbers of hangers are to be recycled. Also, the use of hot air involves a risk of damaging the plastics material of the hanger body if the temperature or length of application of the hot air is not within carefully controlled limits.

Preferred embodiments of the present invention seek to overcome the above disadvantages of the prior art.

CONFIRMATION COPY

-2-

According to the present invention, there is provided an apparatus for removing adhesive labels from garment hangers, the apparatus comprising:

washing means adapted to direct pressurised liquid onto an adhesive label of at least one garment hanger for melting adhesive of said label and removing said label from the hanger;

loading means for transporting the or each said hanger towards said washing means;

unloading means for transporting the or each said hanger away from said washing means; and

drying means for drying the or each said hanger subsequently to removal of an adhesive label therefrom.

By directing liquid onto the adhesive label of one or more hangers, this provides the advantage that the liquid can be used to simultaneously melt the adhesive of the label and remove the label from the hanger, which makes the process is suitable for automation. This in turn provides the advantage that labels can be removed from hangers with greater efficiency and cost-effectiveness.

The loading means preferably comprises at least one rotatable shaft having a respective helical groove for engaging a hook of at least one said hanger, wherein rotation of the or each shaft about its respective longitudinal axis in use moves hangers along the or each said shaft towards said washing means.

By providing loading means having at least one rotatable shaft having a respective helical groove for engaging a hook of at least one hanger, this provides the advantage that the hangers can be easily and rapidly loaded onto the or each shaft.

-3-

At least one said rotatable shaft preferably has a respective groove-free portion for receiving at least one said hanger prior to movement of the hanger towards the washing means.

This provides the advantage of enabling hangers to be rapidly placed on the or each shaft but minimises the risk of the hangers becoming tangled.

In a preferred embodiment, the depth of at least one said groove increases in use in a direction towards said washing means.

This provides the advantage of enabling successive hangers on a shaft to be separated prior to washing thereof.

The washing means may comprise spraying means for directing at least one stream of liquid at elevated temperature onto an adhesive label of at least one hanger.

The spraying means is preferably adapted to direct at least one said stream in a side-to-side and/or up and down motion.

This provides the advantage of assisting in removing the labels from the hangers.

The apparatus may further comprise recycling means for recycling said liquid subsequently to spraying thereof onto at least one hanger.

The unloading means may comprise at least one rotatable shaft having a respective helical groove for engaging a hook of at least one said hanger, wherein rotation of the or each shaft about its respective longitudinal axis in use moves hangers along the or each said shaft away from said washing means.

-4-

The drying means may at least partially surround said unloading means.

The drying means may comprise an elongate chamber for drying at least one said hanger.

In a preferred embodiment, the apparatus further comprises further drying means for at least partially drying at least one hanger subsequently to washing thereof and prior to transport thereof by said unloading means.

This provides the advantage of removing the bulk of the liquid from the hanger subsequently to washing, so that the time a hanger spends adjacent the drying means can be minimised.

The apparatus may further comprise support means for supporting a hanger during washing thereof by said washing means.

The support means may comprise a rotary support member for supporting at least one hanger and adapted to rotate to move the or each said hanger from a position facing said loading means to a position facing said washing means and/or from a position facing said washing means to a position facing said unloading means.

The apparatus may further comprise locking means for locking at least one said hanger in position on said rotary member.

The locking means may comprise at least one hook receiving member for receiving a respective hook of a hanger, and is adapted to lock at least one hanger in position on said rotary member in response to receiving a hook on at least one said hook receiving member.

-5-

A preferred embodiment of the invention will now be described, by way of example only and not in any limitative sense, with reference to the accompanying drawings in which:-

Figure 1 is a schematic perspective view of a label removal apparatus embodying the present invention;

Figure 2 is a schematic perspective view from inside of a rotary support means of the apparatus of Figure 1; and

Figure 3 is a schematic perspective view from outside of the rotary support means of Figure 2.

Referring to Figure 1, an apparatus 1 for removing adhesive labels from garment hangers includes an input conveyor 2 for receiving garment hangers (not shown) and which terminates in a loading station 3 for loading the hangers onto a rotatable support 4. The support 4 faces a washing station 5, a pre-drying station 6 and an unloading station 7 for unloading hangers from the support 4 onto an output conveyor 8 which passes through an elongate drying chamber 9.

The input conveyor 4 includes four rotatable shafts 10 adapted to be rotated about their longitudinal axis by means of respective motors 11. The shafts 10 are each provided with three sections. The first section, at the end of the shaft 10 remote from the loading station 3, is flat and free of grooves, so that hangers can be rapidly placed on the shaft 10 without becoming tangled. The second section, which extends from the first section, has a helical groove (not shown) for receiving a hook of a garment hanger, so that the hangers on the shaft 10 separate as their hooks engage the groove. The third section, at the end of the shaft 10 nearest to the loading station 3, has a deeper groove and separates the hangers further as they

-6-

are transported in the direction of arrow A along the shafts 10.

At loading station 3, the hangers are fed from the ends of shafts 10 onto the support 4, which is rotatable about axis 12. Referring to Figure 2, which shows in greater detail that part of the rotatable support 4 which faces the loading station 3, the support 4 is generally octagonal in external shape, and includes eight pairs of hanger receiving plates 13 (only one pair being shown in Figure 2), the plates 13 of each pair being located one on top of the other. Each of the plates 13 is provided with a rod 14 on which the hook of a hanger is received from the end of a shaft 10 at the receiving station 3. A clamp 15 has a pair of arms 16 which are slidable in corresponding apertures in an upper flange 17 of the corresponding plate 13, and each of the arms 16 is provided with an angled end portion 18 which rests on an upper part of the body of the hanger to hold the hanger in position against the plate 13 when the arms 16 are urged downwardly relative to the flange 17. The angled end portions 18 are arranged to hold a hanger in position against the corresponding plate 13 regardless of the shape or size of the hanger. The two clamps 15 are connected to each other by means of a frame 19 which is urged downwardly relative to the plates 13 by means of a cylinder 20 and held in the lower position by means of a cylinder 21 which engages a lock 22. The cylinder 20 is activated by means of the rods 14, so that the clamps 15 are automatically activated as the hangers are hung on the corresponding rods 14. Each of the plates 13 is also provided with a piston 23 for urging a plate (not shown) outwards to remove a hanger from the plate 13. The function of the pistons 23 will be explained in greater detail below.

The support 4 is arranged such that two adjacent pairs of plates 13 face the loading station 3. The hangers facing



-7-

loading station 3 are then transferred to washing station 5 by rotation of the support 4 through 90 degrees about axis 12. At the same time, four further hangers are loaded onto the support 4 at loading station 3.

The washing station 5 includes four water guns (not shown), each of which directs a thin high pressure and high temperature jet of water at the label area of a hanger in an up and down or side to side motion. The high temperature of the water causes the adhesive of the labels to melt, and the force of the spray removes the label and forces it into a collection chamber at the lower part of the washing station 5, where the water, label and adhesive residue are removed for cleaning. The water cleaning is carried out by means of a water purification system, which enables the water to be reused after cleaning. It has been found that the pressure of the water from the water guns should not exceed 120 bar, and the water is applied for about 2 seconds at a temperature of approximately 80° Celsius. Temperatures higher than this should be avoided to minimise the risk of warping of the plastic material of the hangers.

By rotation of the support 4 through a further 90° about axis 12, the four hangers facing the washing station 5 are then brought into a position in which they face pre-drying station 6, which delivers a short blast of high pressure air to remove the majority of the water from washing station 5 from the hangers. Again, with each rotation of the support 4 through 90°, four further hangers are loaded onto the support 4 at loading station 3.

By rotation of support 4 through a further 90°, the hangers are brought to unloading station 7. At the unloading station 7, which is very similar in construction to the loading station 3, pistons 23 are activated to eject the four hangers from the two pairs of adjacent plates 13 facing the unloading station 7,

-8-

which causes the hangers to be loaded onto four rotatable shafts 24 of unloading conveyer 8. The rotatable shafts 24 of the unloading conveyer 8 are similar in construction to the rotatable shafts 10 of loading conveyer 2, each shaft 24 being rotatable about its longitudinal axis by means of a motor 25. The drying station 9 consists of a tunnel about 6 metres long operating at a temperature of 70°C.

The operation of the apparatus will now be described.

Hangers to recycled are loaded manually onto input conveyer 2 and are transported by the conveyor in the direction of arrow A in figure 1. The hangers are then loaded onto the support 4 at loading station 3, secured to the support, and the support is then rotated through 90° to bring the hangers to washing station 5. This rotation brings four further plates 13 into a position facing the loading station 3, which permits four further hangers to be loaded at loading station 3 onto the support 4. The labels are removed from the hangers at washing station 5, and the de-labelled hangers are then delivered to pre-drying station 6 by rotation of the support through a further 90° about axis 12. The majority of the water is removed at pre-drying station 6, which minimises the required power of the drying station 9, and the hangers are then delivered to unloading station 7 by rotation through a further 90°, where they are unloaded from the support 4 and transported through drying station 9 by means of unloading conveyer 8 in the direction of arrow B. At the end region 26 of unloading conveyer 8, the hangers are manually removed from shafts 24 for recycling.

It will be appreciated by persons skilled in the art that the above embodiment has been described by way of example only, and not in any limitative sense, and that various alterations and

-9-

modifications are possible without departure from the scope of the invention as defined by the appended claims.

-10-

## CLAIMS

1. An apparatus for removing adhesive labels from garment hangers, the apparatus comprising:

washing means adapted to direct pressurised liquid onto an adhesive label of at least one garment hanger for melting adhesive of said label and removing said label from the hanger;

loading means for transporting the or each said hanger towards said washing means;

unloading means for transporting the or each said hanger away from said washing means; and

drying means for drying the or each said hanger subsequently to removal of an adhesive label therefrom.

2. An apparatus according to claim 1, wherein the loading means comprises at least one rotatable shaft having a respective helical groove for engaging a hook of at least one said hanger, wherein rotation of the or each shaft about its respective longitudinal axis in use moves hangers along the or each said shaft towards said washing means.

3. An apparatus according to claim 2, wherein at least one said rotatable shaft has a respective groove-free portion for receiving at least one said hanger prior to movement of the hanger towards the washing means.

4. An apparatus according to claim 2 or 3, wherein the depth of at least one said groove increases in use in a direction towards said washing means.

-11-

5. An apparatus according to any one of the preceding claims, wherein said washing means comprises spraying means for directing at least one stream of liquid at elevated temperature onto an adhesive label of at least one hanger.

6. An apparatus according to claim 5, wherein said spraying means is adapted to direct at least one said stream in a side-to-side and/or up and down motion.

7. An apparatus according to claim 5 or 6, further comprising recycling means for recycling said liquid subsequently to spraying thereof onto at least one hanger.

8. An apparatus according to any one of the preceding claims, wherein said unloading means comprises at least one rotatable shaft having a respective helical groove for engaging a hook of at least one said hanger, wherein rotation of the or each shaft about its respective longitudinal axis in use moves hangers along the or each said shaft away from said washing means.

9. An apparatus according to any one of the preceding claims, wherein said drying means at least partially surrounds said unloading means.

10. An apparatus according to claim 9, wherein said drying means comprises an elongate chamber for drying at least one said hanger.

11. An apparatus according to any one of the preceding claims, further comprising further drying means for at least partially drying at least one hanger subsequently to washing thereof and prior to transport thereof by said unloading means.

-12-

12. An apparatus according to any one of the preceding claims, further comprising support means for supporting a hanger during washing thereof by said washing means.

13. An apparatus according to claim 12, wherein said support means comprises a rotary support member for supporting at least one hanger and adapted to rotate to move the or each said hanger from a position facing said loading means to a position facing said washing means and/or from a position facing said washing means to a position facing said unloading means.

14. An apparatus according to claim 13, further comprising locking means for locking at least one said hanger in position on said rotary member.

15. An apparatus according to claim 14, wherein said locking means comprises at least one hook receiving member for receiving a respective hook of a hanger, and is adapted to lock at least one hanger in position on said rotary member in response to receiving a hook on at least one said hook receiving member.

16. An apparatus for removing adhesive labels from garment hangers, the apparatus substantially as hereinbefore described with reference to the accompanying drawings.

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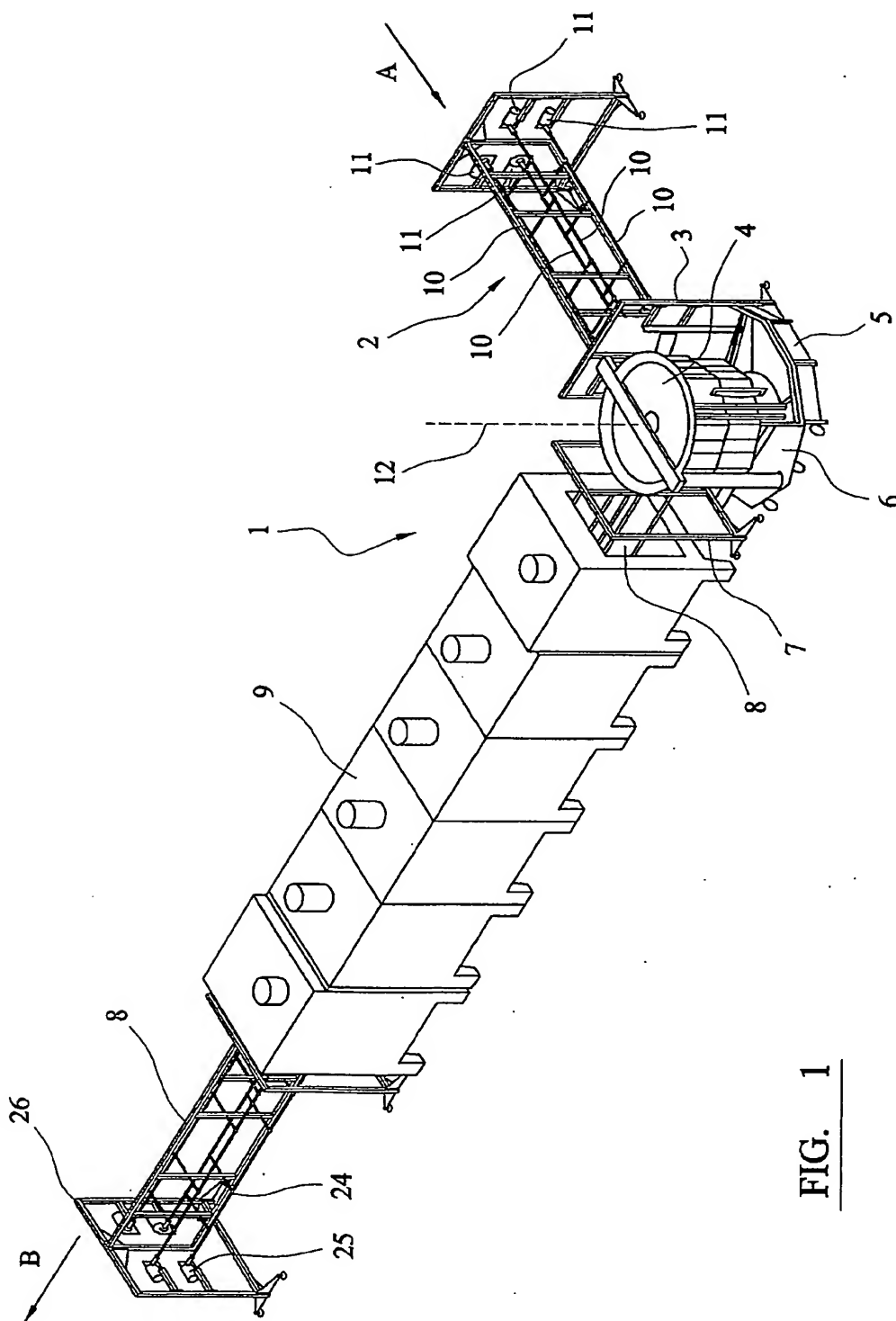
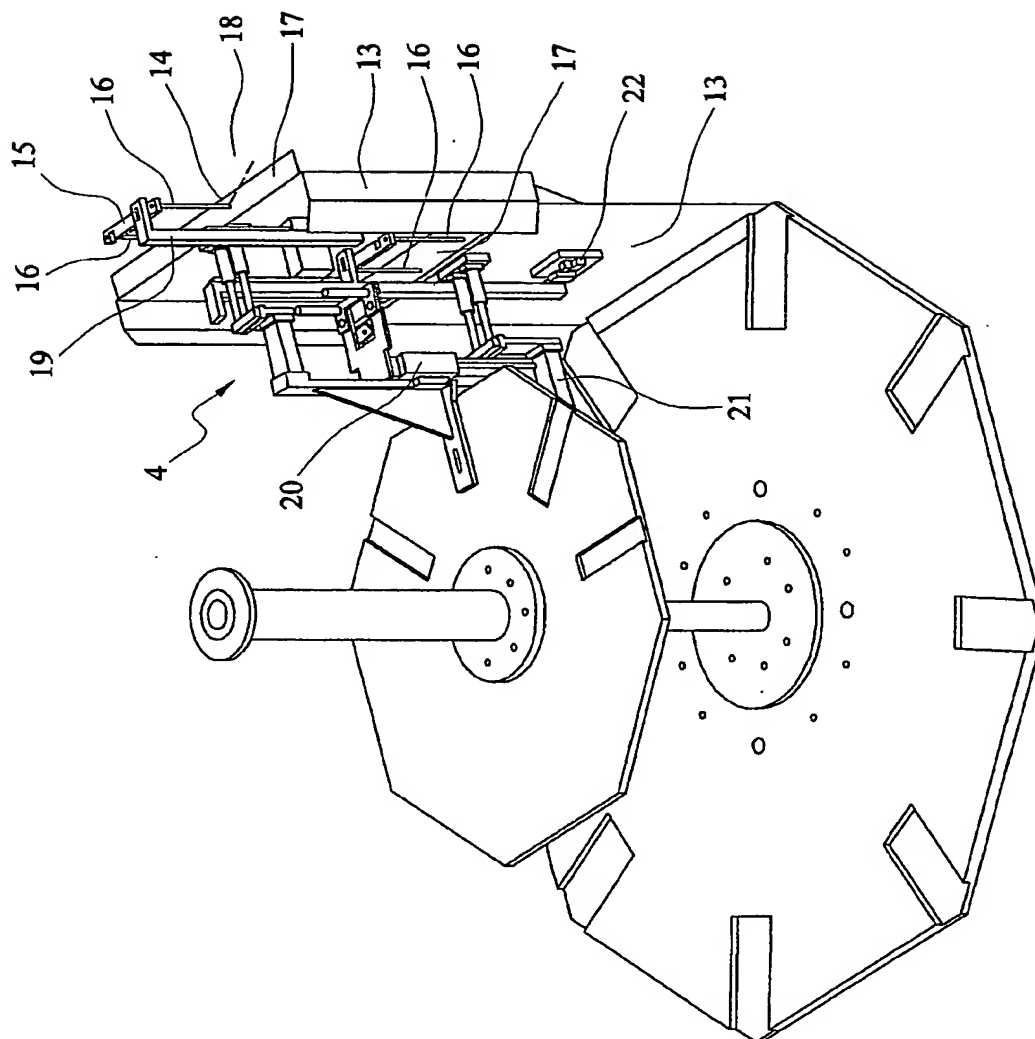


FIG. 1

FIG. 2





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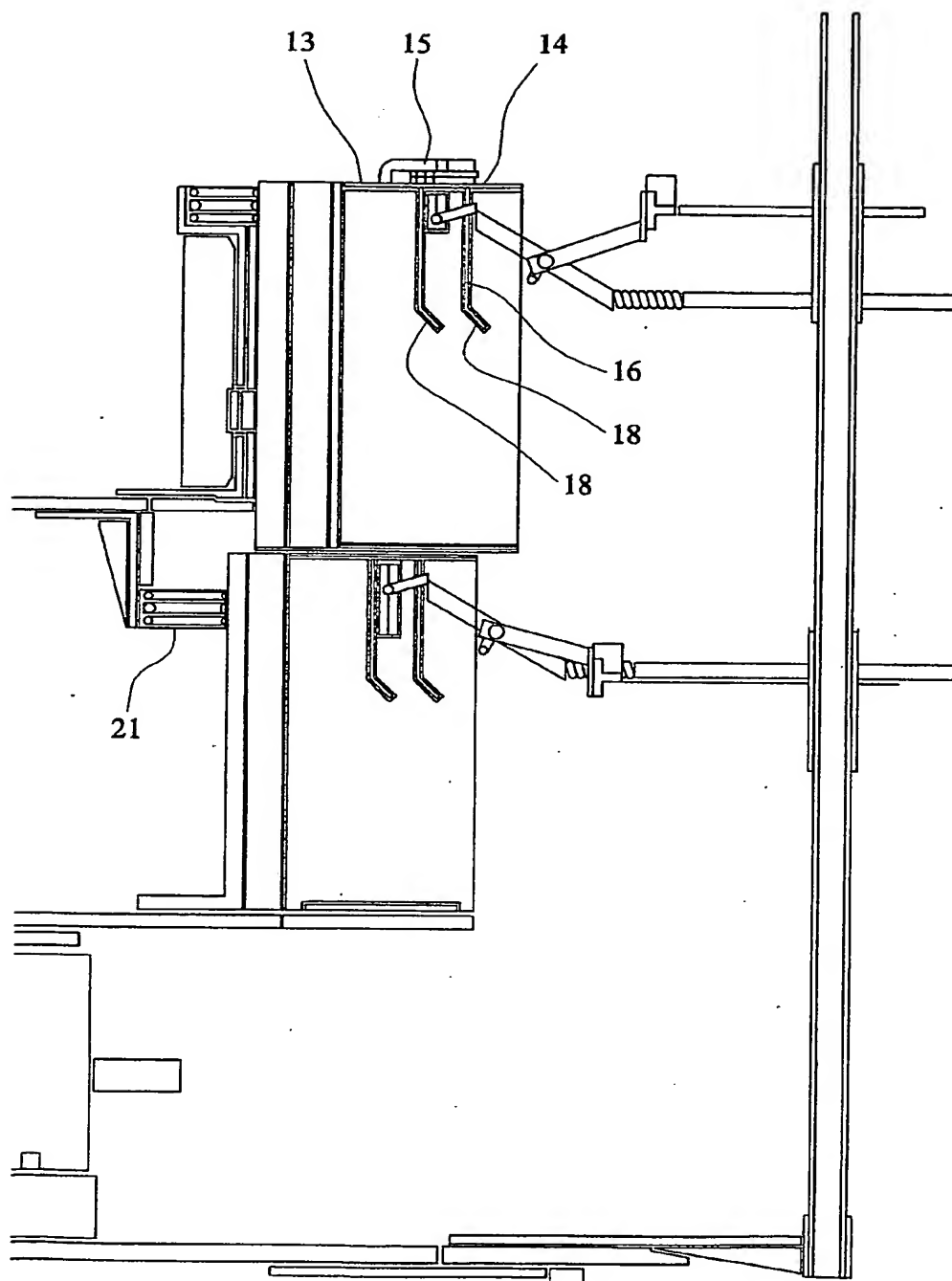


FIG. 3

SUBSTITUTE SHEET (RULE 26)

## INTERNATIONAL SEARCH REPORT

Internal Application No  
PCT/GB 03/00148A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 B08B3/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B08B B29C C09D B29B B03B A47G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 197 35 201 A (SEMMELOTH ANLAGENTECHNIK) 18 February 1999 (1999-02-18) abstract column 3, line 7 - line 62; figures	1,5-7, 12-14
A	US 6 090 238 A (SMITH) 18 July 2000 (2000-07-18) abstract column 1, line 46 - line 61 column 2, line 66 - column 3, line 60	1,5,6
A	PATENT ABSTRACTS OF JAPAN vol. 012, no. 482 (C-553), 15 December 1988 (1988-12-15) -& JP 63 199784 A (NIPPON CARBIDE IND CO LTD), 18 August 1988 (1988-08-18) abstract --- -/-	1,5,6



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*Z\* document member of the same patent family

Date of the actual completion of the international search

1 April 2003

Date of mailing of the international search report

09/04/2003

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## INTERNATIONAL SEARCH REPORT

Interns Application No

PCT/GB 03/00148

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 558 280 A (MORGAN) 24 September 1996 (1996-09-24) abstract column 3, line 59 -column 4, line 9 column 5, line 3 - line 64; figures -----	

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 16

Not allowable, rule 6.2 (a) PCT.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

# INTERNATIONAL SEARCH REPORT

Int'l application No.  
PCT/GB 03/00148

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☒ Claims Nos.: 16  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:  
see FURTHER INFORMATION sheet PCT/ISA/210
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 03/00148

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